P/1909-163 (V6666)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF APPEALS AND INTERFERENCES

In re Patent Application of		**Confirmation No.: 4959**	
	Ryu YOKOYAMA	Date:	February 1, 2008
Serial No.:	10/633,927	Group Art Unit: 3633	
Filed:	August 4, 2003	Examiner:	Ari M. DIACOU
For:	OPTICAL TRANSMISSION SYSTEM AND OPTICAL AMPLIFICATION METHOD USING IN THE SYSTEM		

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APPEAL BRIEF PURSUANT TO 37 C.F.R. §41.37

Sir:

This Appeal Brief concerns the propriety of the Examiner's final rejection of this application mailed June 4, 2007. In support of the Notice of Appeal filed on November 2, 2007, the following Appeal Brief is presented.

Real Party in Interest

The real party in interest is the assignee, NEC Corporation.

Related Appeals and Interferences

The applicant(s), the assignee(s) and the undersigned attorneys are not aware of any related appeals and interferences.

STATEMENT OF CLAIMS

Claims 11-13 and 15-16, which were finally rejected on June 4, 2007, are on appeal. Claims 1-10, were not elected in a response to a restriction requirement and they have been withdrawn from consideration, and are not on appeal. Claim 14, was also rejected under 35 USC

112, second paragraph. However, a response, without claim amendment, was made on August 28, 2007. In an Advisory Action of September 13, 2007, the Examiner considered the arguments made with respect to the rejection of claim 14 under 35 USC 112, second paragraph, as being persuasive, but made no formal withdrawal of the rejection. Appeal of claim 14 is considered to be moot and confirmation is requested.

STATUS OF AMENDMENTS

Claims 11-15, of original claims 1-15, were elected in a Response to Restriction Requirement of October 24, 2004, and claims 1-10 were withdrawn. Claims 11-15 were amended on February 23, 2006 and new claim 16 was added. Claims 11-16 were amended on August 4, 2006, with such amendments having been entered with the filing of an RCE on September 12, 2006. Claims 11-16 were again amended on February 15, 2007, which amended claims are presently on appeal.

Claims 11-13 and 15-16 were finally rejected in an official action of June 4, 2007 with the rejection of claim 14 being admitted by the Examiner as not being viable.

SUMMARY OF CLAIMED SUBJECT MATTER

The invention of the present application, as set forth in the rejected claims 11-13 and 15-16 (the rejection of claim 14 under 35 USC 112, 2nd par. has been unofficially withdrawn but reference is made thereto) is an economical and effective optical amplification method for an optical transmission system, having both first and second light sources, for maintaining a constant light signal level (or character), despite adeteriorated state of first light sources.

In effect and in summary, the presently claimed invention (claim 11) entails a method for a Raman amplification system with amplified first and second light sources which are “disposed at positions adjoining each other” (page 8, lines 13-20). Signal light deterioration or failure is a problem (page 8, lines 23-27) which the present method invention addresses. In the prior art, restoration of signal light was effected by providing each of the signal light sources with its own spare pumping light source, a very expensive and volume problematic expedient. In accordance with the present invention, deterioration of light signal in the first light sources, is detected (line 26-28) and then the light signal is restored to its original state by spare pumping light sources which are only associated with the second light sources (line 28-page 9, line 2) and with the only function of the spare pumping light sources being such restoration (page 12, lines 7-10 and with

reference to Figure 1 and reference characters 11 and 12 of spare pumping light sources). With such operational configuration, the number of spare pumping light sources is less than the number of first light sources, with the actual number of such first light sources being determinable by a permissible failure rate (this is calculated as described at page 15, line 7-page 16, line 16 and with reference to the graph of Figure 4 and description at page 16, line19-26).

Various light signal restorations, all with respect to the first light source, are effected thereby:

A modification of the invention comprises the further step that responsive to a deteriorated state of the amplified signal light, spare pumping light is emitted from the spare pumping light source so that the output level of the signal light re-attains the same output level before the deterioration (claim12) so that there is a full restoration of function.

Alternatively, in response to the deteriorated state of the amplified signal light, spare pumping light is emitted from the spare pumping light source so that the gain wavelength characteristic of the signal light becomes the same gain wavelength characteristic before the deterioration (claim 13).

Another situation includes the inclusion of first and second spare pumping lights having first and second wavelengths, only in association with the second light sources, which respectively restore the first and second wavelengths (claims 14 and independent claim16, broadly stated at page 9-lines 14-20).

Optionally the outputs from the pumping light source and spare pumping light source are controlled by respective control circuits in the one or more first and second light sources (claim 15).

In more detail relative to the independent claim 11 and 16 parameters and with reference to the specification and drawings:

With reference to claim 11:

(page 8, line 13 – page 9, line 2 –the defined 11th aspect of the invention) The optical transmission system is comprised of a plurality of first light sources that amplify signal light transmitted in an optical transmission line and a plurality of second light sources that are disposed at positions adjoining respective ones of the plurality of first light sources.

The basic steps of the method of the present invention are:

amplifying the signal light by the first light sources for Raman amplification;

transmitting the amplified signal light through an optical transmission line;

providing one or more spare pumping light sources but only in the plurality of second light sources, with the number of the second light sources being less than the number of first light sources, so that a number of first light sources which do not have spare pumping light sources, intervening between two second light sources, being determined by a permissible failure rate of the optical transmission system (this is calculated as described at page 15, line 7-page 16, line 16 and with reference to the graph of Figure 4 and description at page 16, line19-26);

detecting a deteriorated state of the signal light amplified by one or more of the first sources; and

restoring the deteriorated signal light to an un-deteriorated state by emitting spare pumping light from at least one of the spare pumping light sources,

with the spare pumping light sources being operated only when required to restore deteriorated signal light (page 12, lines 7-10 and with reference to Figure 1 and reference characters 11 and 12 of spare pumping light sources).

With reference to claim 16 (page 8, line 13 – page 9, line 2 and lines 14-19, the defined 11^{th} and 14^{th} aspects of the invention):

An optical amplification method for an optical transmission system including a plurality of first light sources for Raman amplification for amplifying signal light transmitted in an optical transmission line and a plurality of second light sources for Raman amplification for amplifying signal light transmitted in said optical transmission line, wherein ones of said plurality of second light sources for Raman amplification are disposed at positions adjoining respective ones of said first light sources for Raman amplification, said method comprising the steps of:

amplifying said signal light at first and second wavelengths by at least one of the plurality of said first Raman amplifiers ;

transmitting, by the at least one of the plurality of said first Raman amplifiers, said amplified signal light through said optical transmission line;

providing, only in said plurality of second light sources for Raman amplification, a first spare pumping light source operating at a first wavelength for Raman amplification, and a second spare pumping light source operating at a said second wavelength for Raman amplification (Figure 1, elements 11 and 12);

detecting a deteriorated state of said signal light in said optical transmission line at said first wavelength, and/or said second wavelength; and

restoring said deteriorated signal light to an un-deteriorated state by operating said first or second spare pumping light sources,

said first and second spare pumping light sources being operated only when required to restore deteriorated signal light at their respective operating wavelengths (page 12, lines 7-10 and with reference to Figure 1 and reference characters 11 and 12 of spare pumping light sources), a total number of said first light sources for Raman amplification and a total number of said second light sources for Raman amplification being determined by a permissible failure rate of the optical transmission system (this is calculated as described at page 15, line 7-page 16, line 16 and with reference to the graph of Figure 4 and description at page 16, line19-26) .

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 11-13 and 15 were rejected by the Examiner as being unpatentable under 35 USC 103(a) on the basis of the combined teachings of Namiki et al (PGPub No. 2001/0050802) in view of Zarris et al (PGPub No. 2002/0085268) and claim 16 was rejected by the Examiner as being unpatentable under 35 USC 103(a) on the basis of the combined teachings of Namiki et al (PGPub No. 2001/0050802) in view of Zarris et al(PGPub No. 2002/0085268) and further in view of Grubb et al (PGPub No. 2002/0067539).

Specifically, the Examiner has cited the Namiki et al reference as teaching an optical amplification method in an optical transmission system with a plurality of first light sources for Raman amplification and adjoining plurality of second light sources for Raman amplification with essentially the steps of (with the Examiner citing reference paragraphs in the Namiki et al. disclosure as showing the enumerated step):

1) amplifying the signal light with the first and second light sources for Raman amplification [Figure 23],

2) transmitting the amplified signal light through a transmission line [Figure 23],

3) detecting a deteriorated state of first and second light sources [Par. 0169]

4) restoring signal light by emitting spare pumping light from the spare pumping light sources [0168]

5) the spare pumping light sources are operated only when required to restore deteriorated signal light [0169].

The Zarris reference was cited as teaching that:

1) the spare pumping light sources are provided only with the second light sources [007]
2) the number of spare pumping light sources are less than the number of first light sources [0007]
3) the number of first light sources not having spare pumping light sources intervening between two of the second light sources spare pumping light sources are determined by permissible failure rate of the optical transmission system [007].

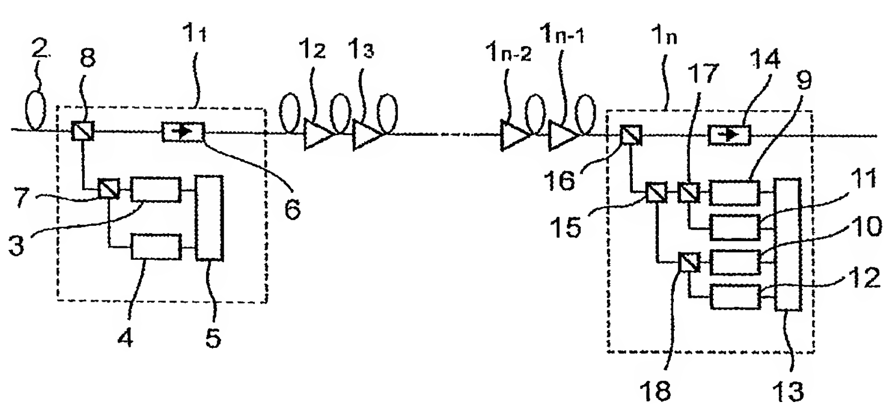
The Examiner concluded that it would have been obvious to one skilled in the art to add m spare pumps to the n pump array in the Namiki device and have (n-m)/m pumps between each spare and m < n, for the advantage of cost and simplification.

With respect to claim 16, the Examiner noted that claim 16 differed from claim 11 only in that claim 16 does not require that all pumps appear in the same amplifier mode and Namiki and Zarris do not disclose pumping from a plurality of amplifier modes. Accordingly the Examiner cited Grubb as teaching that the pumping can be spread over a number of amplifiers in the system [0019] and that this would have been effected by one skilled in the art for the advantage of reduced cost.

ARGUMENTS

Independent claims 11 and 16 specifically relate to an optical amplification method for an optical transmission system having a plurality of first light sources **and** a plurality of second light sources. Figure 1 of the present application is exemplary of this system configuration (with first and second light sources 11 and 1n):

F I G. 1



Namiki et al., the primary reference cited by the Examiner does not disclose, teach or suggest, anything other than a single plurality of light sources (i.e., similar to Applicant's plurality of first light sources). Figure 23, cited by the Examiner, as illustrating the Namiki et al. system is exemplary of this single plurality of light sources configuration (101-108).

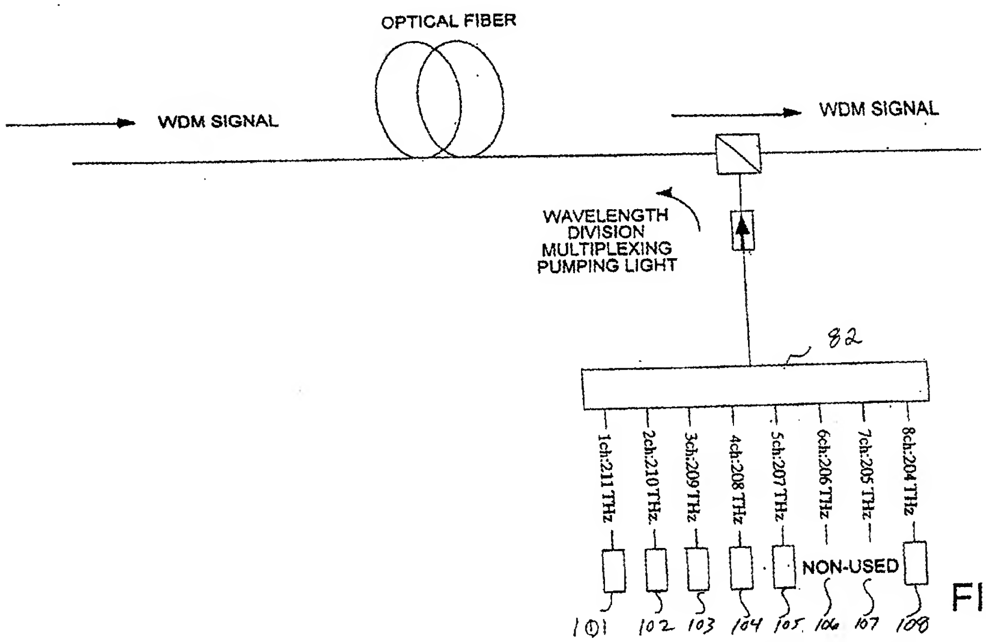


FIG. 23

The Examiner has made the initial assumption and assertion that Namiki et al. discloses Applicant's basic optical transmission system without any suggested modification or reasoning. Thus, *ab initio*, there is here a classical "oranges" and "apples" defective application of a reference to a claimed invention to which it does not relate. Note that the secondary Zarris et al. actually goes a step further in a direction away from the presently claimed invention by preferring a single light source and without a plurality of light source. For this reason alone, the rejections based on the Namiki et al. reference should be reversed.

However, even were it to be conceded (which it is not) that the Namiki et al reference does disclose an optical transmission system with first and second plurality of light sources, Namiki et al., even in combination with Zarris et al, would not provide the presently claimed invention.

The method steps of both independent claims 11 and 16 require one or more spare pumping light sources which are **only** in the plurality of second light sources, i.e., not in the plurality of first light sources. Though this is hard to envision as being possible in Namiki et al's system with only a single light source, even assuming some sort of plurality of second light

sources, there is nothing in Namiki et al. to teach or even vaguely suggest a positioning limitation as in the present claims of the spare pumping light sources being only in the plurality of second light sources.

Furthermore, because of the use of the same word "spare", the Examiner has equated the "spare" pumps of Namiki et al as being equivalent to the "spare" pumping light sources of the present claims. The Examiner has however failed to consider that the definition and use of the term "spare" in the Namiki et al reference is specifically different from the definition and use of the term "spare" in the present claims, with a specifically claimed limitation in the definition of the term. The present claims require that the spare pumping light sources be operated **only** when required to restore deteriorated signal light. In contrast, at every reference to the element "spare" pump in Namiki et al. (paragraphs [0152], [0163] and [0168]) there is a full description of how the "spare" is present in the working system of Namiki et al and used for modification of normal light output characteristics. The only reference in Namiki et al to correction of a non-operating pump is with use of another pump in the system which is in a different on/off state. The meaning of "spare" in Namiki et al. is clearly that of a normally operating pump which is in a different state at a required moment. It is not a truly "spare" element dedicated to a single particular use of deterioration conrrection. The Examiner has accordingly ignored a specific claim limitation. When this deficiency was brought to the Examiner's attention in a response to the final rejection, the Examiner noted, in an Advisory Action that:

"…Applicant argues that Namiki doesn't teach "only when required to restore deteriorated signal light…Zarris teaches redundancy, which cures the deficiency in Namiki…"

It is instructive to note that Zarris mentions the term "redundancy" twice, once in paragraph [0007] and again in paragraph [0011] but does not utilize any redundant pump sources in the described invention and initially denigrates the use thereof:

[0007] …Furthermore, -n systems where higher reliability is need, the number of redundant pumps included may be as high as the number of working pumps which in turn exaggerates the problems of cost, size and complexity for the amplifier.

[0011] …Also further pump source(s) may need to be provided for the purpose of redundancy.

How this cures the deficiency in Namiki is a mystery. Why would one skilled in the art faced with the problems described by Zarris with redundant pumps use them in place of working

pumps which can also function to restore deteriorated light? The Examiner's position is thus without logical merit and the rejection should be reversed on this basis as well.

As an additional basis for reversal another limitation of the claims, not found in any of the cited references, is that of relative number of first and second light sources, the number of first light sources, not having spare pumping light sources, intervening between two of the second light sources and this being determined by a permissible failure rate of optical transmission system. Neither of the cited Namiki et al. and Zarris et al. references teach anything even remotely related to this limitation. Since neither of the references disclose first and second light sources they cannot perforce show the limitation but even with a concession that they do, the Examiner, in the Final Rejection, has concocted the following as a basis for the limitation:

The Examiner cited paragraph [0007] of Zarris et al. (see above quote from the paragraph) as teaching that the spare pumping light sources are provided only with the second light sources [0007]; that the number of spare pumping light sources are less than the number of first light sources [0007]; and that the number of first light sources not having spare pumping light sources intervening between two of the second light sources spare pumping light sources are determined by permissible failure rate of the optical transmission system [0007] and concluding that it would have been obvious to one skilled in the art to add m spare pumps to the n pump array in the Namiki device and have (n-m)/m pumps between each spare and m < n, for the advantage of cost and simplification. It is very difficult to believe that one skilled in the art, even with normal creative abilities, would be able to arrive at the claim limitation described above from the simple statement that, "Furthermore, -n systems where higher reliability is need, the number of redundant pumps included may be as high as the number of working pumps which in turn exaggerates the problems of cost, size and complexity for the amplifier." Again, reversal of the rejection is appropriate, for failure to provide a viable basis for the rejection of a claim limitation.

In a further deficiency of the rejection of the claims, the Examiner, with respect to the rejection of claim 11, has neglected to address the claim limitation of detecting a deterioration of a signal in the first light source and restoring the deteriorated signal light by the spare pumping light source(s) in the second light source.

Similarly, the Examiner, with respect to the rejection of claim 16, has failed to address the limitation of detecting deterioration signal light of first and/or second wavelength signals in

the first light source and restoring signal light by operating first and second spare pumping light sources at the first and second wavelength. The cited Grubb et al reference was cited as a teaching of an unrelated pumping from a plurality of amplifier nodes (a difference apparently perceived by the Examiner as differentiating claims 11 and 16). Nevertheless, Grubb et al does not teach the limitations of claim 16, which in fact differ from those of claim 11. Again, reversal of the Examiner and withdrawal of the rejection is in order. Though Grubb et al may show a system having what appears to be first and second light sources, Applicant has never claimed that such system does not exist and is not in the prior art but has provided a method for correcting deficiencies in such an optical transmission. None of the cited prior art whether alone or in combination provides the claimed invention.

CONCLUSION

The Examiner should be reversed and claim 11-13 and 16 should be allowed (and claim 14 should be confirmed as being allowed) for at least the following reasons:

1) The primary Namiki et al. reference discloses only systems not relevant to the claimed system;
2) The Examiner has failed to consider and find prior art with respect to numerous claim limitations;
3) The Examiner has grossly exaggerated what one skilled in the art would arrive at from the specific teachings of the prior art.

Claims 12, 13 and 15 depend directly from independent claim 11 and there is apparently no rejection against claim 14 and are, therefore, allowable for the same reasons, as well as because of the combination of features in those claims with the features set forth in the respective independent claims.

For the reasons set forth above, it is respectfully submitted that all rejections to the claims in this application have been addressed to clearly define over the prior art. Therefore, the Board of Appeals and Interferences is respectfully requested to reverse the Examiner and allow the case to issue.

Applicant reserves the right to request an oral hearing upon receipt of the Examiner's Answer. Credit card payment for the required filing fee in the amount of $510 (large entity) is submitted via EFS-WEB.

In the event the actual fee is greater than the payment submitted or is inadvertently not enclosed or if any additional fee during the prosecution of this application is not paid, the Patent Office is authorized to charge the underpayment to Deposit Account No. 15-0700.

THIS CORRESPONDENCE IS BEING SUBMITTED ELECTRONICALLY THROUGH THE UNITED STATES PATENT AND TRADEMARK OFFICE EFS FILING SYSTEM ON FEBRUARY 1, 2008

Respectfully submitted,

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CLAIMS APPENDIX

The Claims on Appeal Are:

11. An optical amplification method for an optical transmission system including a plurality of first light sources for Raman amplification that amplify signal light transmitted in an optical transmission line and a plurality of second light sources for Raman amplification that are disposed at positions adjoining respective ones of said plurality of first light sources for Raman amplification via said optical transmission line, comprising the steps of:

amplifying said signal light by said first light sources for Raman amplification;

transmitting said amplified signal light through said optical transmission line;

providing one or more spare pumping light sources only in said plurality of second light sources for Raman amplification, the number of said second light sources being less than the number of said first light sources, a number of said first light sources not having spare pumping light sources, intervening between two of said second light sources being determined by a permissible failure rate of the optical transmission system;

detecting a deteriorated state of said signal light amplified by one or more of said first sources for Raman amplification; and

restoring said deteriorated signal light to an un-deteriorated state by emitting spare pumping light from at least one of said spare pumping light sources,

said spare pumping light sources being operated only when required to restore deteriorated signal light.

12. An optical amplification method in an optical transmission system in accordance with claim 11, wherein:

responsive to a deteriorated state of said amplified signal light, said spare pumping light is emitted from said spare pumping light source so that the output level of said signal light becomes the same output level before said deterioration.

13. An optical amplification method in an optical transmission system in accordance with claim 11, wherein:

responsive to a deteriorated state of said amplified signal light, said spare pumping light is emitted from said spare pumping light source so that the gain wavelength characteristic of said signal light becomes the same gain wavelength characteristic before said deterioration.

[for allowance confirmation and not on appeal 14. An optical amplification method in an optical transmission system in accordance with claim 11, wherein:

said first and second light sources emit light at first and second wavelengths, and

at least one spare pumping light source is provided for each of said first and second wavelengths.]

15. An optical amplification method in an optical transmission system in accordance with claim 11, wherein:

outputs from said pumping light source and said spare pumping light source are controlled by respective control circuits in said one or more first and second light sources for Raman amplification.

16. An optical amplification method for an optical transmission system including a plurality of first light sources for Raman amplification for amplifying signal light transmitted in an optical transmission line and a plurality of second light sources for Raman amplification for amplifying signal light transmitted in said optical transmission line, wherein ones of said plurality of second light sources for Raman amplification are disposed at positions adjoining respective ones of said first light sources for Raman amplification, said method comprising the steps of:

amplifying said signal light at first and second wavelengths by at least one of the plurality of said first Raman amplifiers;

transmitting, by the at least one of the plurality of said first Raman amplifiers, said amplified signal light through said optical transmission line;

providing, only in said plurality of second light sources for Raman amplification, a first spare pumping light source operating at a first wavelength for Raman amplification, and a second spare pumping light source operating at a said second wavelength for for Raman amplification;

detecting a deteriorated state of said signal light in said optical transmission line at said first wavelength, and/or said second wavelength; and

restoring said deteriorated signal light to an un-deteriorated state by operating said first or second spare pumping light sources,

said first and second spare pumping light sources being operated only when required to restore deteriorated signal light at their respective operating wavelengths, a total number of said first light sources for Raman amplification and a total number of said second light sources for Raman amplification being determined by a permissible failure rate of the optical transmission system.

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.